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Undrinkable water, Untouchable people: Negotiating purity and pollution on a toxic aquifer

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Undrinkable water, Untouchable people: Negotiating purity and pollution on a toxic aquifer

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Dedication

I first visited Kalalanwala in 2016, after Ashaar Rehman sb, the Lahore resident editor of Dawn Newspaper, assigned me a follow up story on this case of water contamination that had occurred in these villages around 20 years ago. I imagined it would be a story of how the government had successfully managed to contain and manage a horrifying example of the impunity the industrial upper class of Pakistan enjoy at the expense of working classes. Instead, I found a sacrifice zone for capitalism: the contamination of the water aquifer was producing intergenerational disabilities and bone deformities, several new factories had propped up in the area, while the existing factories had increased their landholdings. This wasn't a newsworthy story, but it did merit deeper investigation into how these zones are produced and how people make life happen in toxic spaces. Almost every affected person there has repeated their story multiple times in front of various audiences. They map an ecological breakdown from their means of livelihood, agriculture, and cattle farming, to their bodies and their wider social relations. This paper is dedicated to residents of Kot Asadullah and Kalalanwala and communities around the world struggling against corporations and polluting factories for the right to safe drinking water.

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Abstract

Undrinkable water, Untouchable people: Negotiating purity and pollution on a toxic aquifer

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Situated on one of the most heavily polluted deep-water aquifers in Punjab, Pakistan, the residents of two villages, Kot Asadullah and Kalalanwala, have been dealing with the problem of bone deformities among children and osteoporosis, liver disease, and other health problems among adults for over two decades. They trace the prevalence of pervasive disease around the emergence of factories in their area and the subsequent pollution of the water aquifer, a recognition which drives their struggles for access to pure drinking water through the installation of reverse osmosis filtration plants. This paper interrogates the social life of the filtration plant which is shared by residents of both villages and the Christian basti (neighborhood), which straddles the two villages. It asks: how do caste, untouchability, purity, and pollution feature in the social life of the plant? Through an ethnographic exploration of the villages, this paper examines unequal relations of access and the nodes around which are solidarities built in a toxic space, where shared experiences of deformity and death become a segue into deeper conversations about social inequalities.

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Polluting encounters

On a warm evening summer of 2019, the elders of Kot Asadullah and Kalalanwala, two neighboring villages near Lahore, Punjab, gathered in the courtyard of a mosque to mediate tensions over how to share water between Christian and Muslim residents of the villages. Earlier, a fight had broken out between two women who had come to collect water at the Human Necessity Foundation's filtration plant, where residents of both villages collect their drinking water from. A person at the panchayat (a village council for mediations of local disputes) that day described the incident, saying:

"It's mostly women who collect water. That day a woman from Kalalanwala accused a woman from the Christian basti of bumping her water bottle into hers and making it impure. The Christian woman, in turn, accused her of being backward in her thinking. Other Christian women in the queue behind them joined the argument which quickly turned into a scuffle and the women waiting in line for their turn to collect water started to throw their bottles, buckets, and shoes at each other. Several men in the crowd intervened and told the Christian women to leave or they wouldn't allow *chuhras* to use the filtration plant anymore. 'Go get your own [filtration plant]', one of the men told the women."

Chuhra, a derogatory term, signals caste untouchability; something Punjabi Christians vehemently reject out of its conflation with impurity attributed by upper castes (Singha, 2015). In many cases like this, the term is deployed to not only insult but also to end an argument, reaffirming the lower-caste status of the person or group being addressed. Its use in the context above highlights the ways in which everyday practices of keeping socially appropriate distance and maintaining social relations at the filtration plant in Kot Asadullah can collapse, albeit momentarily. It is a statement of/by the powerful against the perceived collapse of social demarcations in the face of shared precarity and desire for safe drinking water. And it reveals how the perceived transgression of social boundaries by one person could result in blockage of access to water and an existential threat for all residents of the Christian basti.

The filtration plant was installed in 2017 through the efforts of locals reaching out to the NGOs who have had a strong presence in the villages since the water contamination in 2000. Celebrated as the result of collective mobilization of residents of Kalalanwala and Kot Asadullah, the filtration plant supplanted government-installed tubewells and water collection stations to become the main site where residents obtained their water.

Imagined as a 'fix' to the problem of water contamination, the filtration plant may be conceived as encapsulating the residents' desires, hopes, and fears of bodily deformity from the consumption of contaminated water. I argue that the filtration plant becomes not only a geographical space, but also a conceptual site for the making of

difference and hierarchy. Rather than seeing the plant squarely as a stage where difference and hierarchy are played out, I argue that the filtration plant is a laboratory where intimacy and degrees of separation are reproduced and negotiated.

This paper explores the ways in which residents who come to obtain water at the filtration plant negotiate hierarchical and egalitarian logics of sharing water to block or open access to lower caste Christians in the village. Exploring the modalities of sharing water at the plant allows an insight into broader forms of distancing and separation that are spatially mapped onto the village space. This is in the form of uneven development, distribution of resources and disenfranchisement reflected in inter-caste and intra-caste relationships. The emergence of filtration plants as key solutions to water contamination in Pakistan's polluted urban and rural spaces is tied to the growth of NGOs in the development sector. This model of development has allowed for new transformations in previous social categories creating new constellations of power and authority in the villages. This paper examines how social difference and hierarchy along class, caste and religious lines are negotiated as well as (re)produced in the everyday life marked by polluted landscape(s), water scarcity, and struggles for access to safe drinking water.

The filtration plant is a temporary fix. The first plant installed in 2013, in the villages, by the same NGO, exhausted its lifecycle within three years and had to be replaced. The ephemeral presence of the filtration plant and permanence of the pollution requires the residents to come together and demand new fixes to their problem. So, while the plant is a technology that manufactures difference, it simultaneously serves as a

rallying point where people negotiate new subjectivities. I therefore ask: how do people come together but also struggle to maintain distance and negotiate new subjectivities shaped by their social, material, and environmental conditions?

Background

The history of how Christians came to occupy the village peripheries of several Punjab villages in the categories of *kammis*, *chuhra*s and untouchables is connected to the history of the Mass Movement of Punjab. The Mass Movement of Punjab or the Chuhra Movement between 1875 and 1925 saw mass conversions of lower castes – the Meghs (weavers) and Chamars (leatherworkers) but mostly *chuhras* (sweepers) – to Christianity in order to escape caste differences (Pervaiz & Mahmood, 2018; Webster, 1978).

Yet regardless of the conversion, if they were living among Hindus, they would have to live outside the village proper, and work as landless laborers and perform jobs, such as picking up dead animals in the fields, considered polluting to Hindus and Muslims (Walbridge, 2003). These landless laborers and peasants were enrolled as seipis and atharhis (farmhands and village servitors). The management of occupational specialization, and maintaining caste relations, in villages under the romanticized jajmani system involved non-monetary exchange of surplus harvest as payment for the loyalty and service of the farmhands and servitors (Subedi, 2014). This system of circulation of non-monetary goods from upper castes (jajman) to lower castes was seen as ritualized subordination of lower castes, who accepted and acknowledged their position in caste society through their participation in the system. By the 1920s, the term *chuhra* became synonymous with Issaee (followers of Jesus).

During the Partition between India and Pakistan in 1947, only 60,955 out of 500,000 Punjabi Christians lived in Eastern Punjab that became a part of India. In her examination of the historical processes that constructed perceptions of community and sovereignty in Pakistan, Ayesha Jalal (2001) writes that Christian leader Dewan Bahadur S.P. Singha who lived in Batala, east Punjab, and the other two Christian MLAs in the Punjab Assembly at the time had thrown their weight behind Punjab's vote for Pakistan believing it to be safer for Christians than Hindustan. She argues that long associations with Muslims in Punjab had "Muslimized" the Christians in culture and outlook, along with a mutual hatred for practices of untouchability and caste.

In S.P. Singha's January 20, 1948 speech in the West Punjab Legislative Assembly, he raised the problem of mass homelessness among Christian atharis and seipis who had been displaced from the villages following the partition and resettlement of new migrants and were migrating to cities to look for jobs. In the cities, they were expected to take on 'polluting' jobs as Singha quotes a deputy commissioner complaining to him: "they don't pick up the dung or carrion".

Singha went on to explain that in many villages the seipis and atharis had separate wells which were occupied by the new migrants so that they were deprived of drinking water. "They are told these wells belong to Pakistan now, you should leave from here," he said. Singha's speech in the legislative assembly describes the ways in which previous social relations constructed through a village occupational system were transforming with

a shift in landownership, socio-religious patterns, and massive internal migration. But these transformations were reproducing caste relations. Singha's advice to the deputy commissioner who had complained about the Christians' resistance to performing menial tasks was to give those jobs to people who had been traditionally involved in menial work.

In his ethnography of villages in Sahiwal, located at an hour-and-a-half drive from Kalalanwal and Kot Asadullah, Saghir Ahmad (1977) examined the changes taking place in village organization during the beginning of what came to be known as the Green Revolution. This was in the backdrop of the land distribution reforms of 1959 that had aimed at more equitable distribution of land while the Basic Democracies Act sought to institutionalize political participation at the village level. Ahmad observed the various ways in which wage-labor relations had supplanted previous forms of relations between different castes. These new relations often involved bonded labor through advanced loans adding uncertainty to an already precarious economic situation for these classes (Aqeel, 2015; Webster, 1978). But while the village landholding structure has always been a malleable construction, open to shifts and changes corresponding to larger social, political, and economic processes, its spatial organization follows caste prescriptions of separation and distancing (Gupta, 2005).

Several waves of inward and outward migration over time made and unmade social alliances based on baradari, religion and occupation in Kot Asadullah and

Kalalanwala. It was during the 1960s that the Christian basti in Kot Asadullah expanded into an informal settlement, eventually accommodating 200 households. Though many families in the basti are historically tied to agriculture, the villages' location in the midst of dry ports, agriculture markets, brick kilns, tanneries and industries allowed for a more diverse range of occupations.

In her ethnography of Khushpur, a Punjabi Christian village, Linda Walbridge (2003) says that residents of villages established by church missions deny that they are of chuhra backgrounds, arguing that chuhras could never have done agricultural work so they would never have been brought by the missions to cultivate the new canal colonies being built in the Punjab under the agriculture colonization schemes. Instead, they argue that chuhras lived in cities where they were employed as sweepers or as kammis (untouchables) outside the village walls (Singha, 2015; Webster, 1978). Rather than rejecting the social construction of ritual pollution, inter-caste relations between Christians were reflective of them.

These inter-caste relationships are an important backdrop to understanding contemporary debates around caste untouchability and pollution in Pakistan. In this context, Peter H Streefland's ethnographic study *The Sweepers of Slaughterhouse: Conflict and Survival in a Karachi Neighborhood* was the first to make the argument about a 'double discrimination' against Christians based on caste and religion. Singha

(2015) writes that Streefland's study was heavily criticized among the Pakistani middle class that was defensive because they deny the Dalit roots of the Protestant church.

The disavowal of caste among Pakistan's Christians, for Singha (2015), accompanies counternarratives produced by Dalit Christians that seek to reconstruct a genealogical history severed from Dalit ancestry and rooted in the history of Christianity in South Asia instead. Her ethnographic research in Karachi and Punjab explores the many facets of caste persecution that reveals the role of middle-class Christians that also treat *chuhra* Christians with contempt.

Singha quotes an activist as saying: "Public denial of caste is so ingrained and widespread that there is no official legislation that acknowledges and addresses caste-based discrimination." This disavowal does not undo an internalization of caste discrimination. In his op-ed on the famous blasphemy allegation against Aasia Bibi, a lower caste Christian woman, Faisal Devji (2018) argues that public disavowal of caste allows Muslims, who attribute the practice to Hindus in India, to minimize their own caste differences by projecting discrimination outward. In this way, Muslims are able to construct the idea of an allegedly egalitarian system of 'Islamic Brotherhood' that is upheld in the very idea of Pakistan (Fuchs & Fuchs, 2020).

However, since the discrimination cannot be defined in terms of caste because of its roots in Hindu practice, it is labelled religious instead (Gazdar, 2007; Singha, 2015).

Hassan Javid and Nicholas Martin (2020) have written about how caste is erased at the level of state legislation and political discourse in Pakistan. While the institutional recognition of caste discrimination in India has allowed for political representation and shaped claims making practices for Dalits, it has also fragmented the community along class lines. In Pakistan, they argue, caste continues to underpin questions of respect, economic empowerment, and social mobility but is absent from formal (and informal) political discourse. They suggest instead an emancipatory politics organized around class lines and broad-based progressive politics. Similarly, Saghir Ahmad's work points at the emerging notion of class as an organizing force in villages, replacing former cultural hierarchies and notions of separation. Questions of endogamy, sale of land, sharing utensils and other markers of caste differences have been subsumed by monetized relationships under a capitalist system.

This case study reveals how the categories people occupy constantly shift and change over time. The differences between Christians residing in Kot Asadullah and the basti reveal themselves in moments of negotiating water use at the filtration plant. At the panchayat, the separation of taps reveals power differentials between Muslim residents of Kot Asadullah and Christian residents of the same village. At the same time, it was negotiated by a Christian resident of Kot Asadullah on behalf of residents of the basti. In this context, the call for a unifying class-based politics glosses over the lived experiences, caste, and caste-related hierarchies shaped in an uneven social space. These experiences,

built on and through the construction of uneven space, need to inform progressive politics and interventions around environmental politics.

More recently, the role of caste or inter-caste violence has been manifested in the plethora of blasphemy cases which have been filed, mob violence and murder against Christians in working-class areas of Punjab. The cases have historically revolved around disputes over land, water access, and in some cases to assert political control, but are articulated through violent means. Though there is limited research on caste in the context of growing Muslim-minority tensions in working-class areas, there is an observable pattern of conflicts that seem to instigate or push forth the divisions asserting the superiority of Muslims in the said area. The context of rapid urbanization and development through NGOS reveals class-based oppressions and divisions that work alongside intra-caste machinations through which the Muslim majority asserts caste privilege and hierarchies on an everyday level.

When juxtaposed with the social and economic transformations that have taken place in Kalalanwala, the previous class relations between tenant and servitor, indentured laborers and landlords had changed with the onset of the contamination of the aquifer which narrowed down the range of agricultural activities possible in the villages. It changed the nature of jobs the residents could or could not perform. The slow contamination of the aquifer of the villages from surrounding industries, farmlands, brick kilns and tanneries manifested itself in vivid and dramatic ways toward the end of the

1990s, and fundamentally transformed notions of domination and belonging in the two villages. It is in this context that the filtration plant, presented as a solution to the problem of water contamination by the World Bank/IMF, becomes a site of contestation, revealing inter-caste and intra-caste differences.

The Filter Effect

The desire to provide an imaginary public equal access to safe drinking water was tested at the site of the filtration plant when two women, who seemingly recognized each other, argued over caste prescriptions of maintaining appropriate distance. The panchayat called to settle the dispute between the Christian and Muslim residents gathered at Faisal Mosque in Kot Asadullah was called at the behest of residents of the Christian basti. They had approached the minorities' representative of the union council, who lived in Kot Asadullah, to reach out to other elders at the village. I use the term elders here to refer to residents who were former crop tenants and have strong baradari connections with other families in the villages. The elders also included the focal persons involved in obtaining the filtration plant even though they did not live in the villages. The minorities' representative at the union council did not live in the Christian basti but was nevertheless contacted because of his position, influence, and connections in the wider community.

At the panchayat, someone recommended setting aside a time for Christians to come collect their water at the filtration plant. Another demanded a separate filtration plant for the basti.

"My fellow brothers," the minorities' representative implored, "My nephew is a Christian and he manages the tube-well water supply to Kalalanwala, Kot Asadullah and the Christian basti. He collects money for the electricity bill and his wages from your

households every month. This conflict between Muslims and Christians is not going to work out for anyone as we are facing these [water] problems together."

The matter was resolved after panchayat members decided to allot one tap out of the six taps at the filtration plant for Christians to use. The separation of the taps would not only allow for acceptable distance between Muslim and Christian residents, but also help identify who was Christian and who was not. From my conversations with residents of the basti, I learned that they were annoyed at this decision, especially since it was negotiated by a politically elected representative.

While everyday forms of discrimination and segregation between castes shapes Christian subjectivity, the separation of taps at the plant would distinctly produce identifiable bodies available for discrimination and segregation around notions of purity and impurity. During the summer of 2019, I spent several weeks hanging around the filtration plant speaking to residents and trying to understand how separation is maintained and enforced. What new behaviors would this decision necessitate at the singular point of water collection for both villages? Given the number of people who gather there every day, would this even be possible?

A large white sign board mounted on the wall of the filtration plant has 'Human Necessity Foundation RO (Reverse Osmosis) Plant, Model Village Kot Asadullah Khan, District Lahore', printed on it in large letters. The plant starts pumping water around

midday and shuts down at five o'clock in the afternoon. Household activities are governed by the time of the filtration plant.

Around 11am, when the water starts flowing from the taps, only a few people showed up. Others have learned from experience that the filtration plant needs to run for at least an hour before the levels of toxicants in water can become stable.

"The water is getting bad again. It's not as bad as the water from the old tubewell, but if you notice carefully, the water we get from 11am to 11:30am is as smelly as the tap water. This wasn't the case two years ago when the plant was installed," a woman told me, as I sat myself near the filtration plant and introduced myself to some of the women who were waiting to collect water.

Approaching noon, the street began to get crowded. The vehicles trying to pass in the street would have to honk loudly to pass through and bike riders used their motorcycles to wedge a path through the crowd. Two children, not more than 12 years old, parked their motorcycle near the plant, balancing gallon bottles between them. The crowd comprised mostly women and children, but also adult men. I stood in my corner craning my neck to be able to see the taps and the people in the first row but had to make space for those wanting to get closer to the plant.

Squatting in front of six taps jutting from a blue tiled wall, the first row of people would try to quickly fill up their bottles, with the row behind them breathing down their necks. Jostling others out of their way, those at the back would try to get nearer to the taps. They were in a hurry to collect their water and go home. The conversations were loud as people tried to make themselves heard over the chatter around them.

The ground was slippery from water spilt from bottles and other vessels, and often people would hold on to their neighbors to avoid slipping in the mud. The crowd thinned out in the afternoon as the day got hotter. During this time, people took longer to fill up their bottles and stopped to converse with each other. Those who knew each other would have long mundane conversations about their personal lives, but also the weather, the current government, jobs, and frequent unscheduled power outages. The problem of caste or sharing water did not come up in any conversations and I was warned by residents of the basti not to bring it up either. The residents of the basti told me that it was good if most people did not know I was from a Christian family.

"We use the last tap at the filtration plant," a resident of the basti told me, "But sometimes it is occupied so I'll just quickly get water from another tap without getting noticed."

Not everyone who is at the filtration plant knows each other so it is easy for some Christians to circumvent these rules. "You mustn't bring these topics up in a cavalier

manner and create more problems for us," he warned me. The Christians who use the tap designated for them view it as an expression of their subordination.

Around 4pm, approaching the hour when the water would stop flowing from the filtration plant, a sense of urgency filled the evening air. Given the size of the crowd, it was clear that not everyone would be able to fill up their water bottles for the night. The water stopped flowing from two taps in the middle of the plant at around 4:30pm and those who were standing in front of it, moved to the other taps without skipping a beat. By 4:45pm, the water had reduced to a trickle and those left waiting turned around and left complaining and dejected.

At first glance, the filtration plant appears a neutral zone, an egalitarian space that seeks to provide clean drinkable water to all of the village dwellers. The boundaries of acceptable social behavior appear to blur in moments when children scold adults for pushing them out of their way, or women push past men to get closer to the taps. Those who come to collect water have developed ways to ensure that everyone gets it: standing in line, waiting, sharing space, circulating news and information. So how does an incident of bumping water bottles result in a scuffle around caste hierarchies that everyone present at the filtration plant decides to participate in?

By examining the filtration plant, one realizes that it not only serves the public but functions in producing it. This is rendered through the everyday dependence on the filter

plant as the solitary source of water in the village in which both primarily Christian and Muslim women would come into close contact normally not expected.

The filtration plant not only serves a public; it creates one. The intimacies produced in the close quarters of the filtration plant are varied and create, what Shariqa Thiranagama (2018) terms, hierarchically segmented forms of civility. In her exploration of how post-war trauma in Sri Lanka sets the stage for different modalities of stranger sociability, Thiranagama foregrounds social location and particular histories as a way of understanding how civility and otherness are co-constructed in spaces marked by violence. Her essay focusses on two distinctions that draw on tensions between hierarchical and egalitarian logics: inter-ethnic (external Tamil/Muslim division) and intra-ethnic (internal caste relations). She argues that tensions between hierarchical logics, which enact sets of codes around maintaining hierarchy, and egalitarian logics, demands for dignity and recognition, drive the production of hierarchically segmented forms of civility in heterogeneous settings. Similarly, in Kot Asadullah and Kalalanwala, internal caste relations, religious identities, and social classes tied to NGOs and the development sector forge new constellations of power that negotiate hierarchical and egalitarian logics in providing access to water at the filtration plant.

As the polluted aquifer creates a constant flow of toxicants through all bodies in varying degrees, the residents of Kot Asadullah and Kalalanwala recognize the need to provide equitable access to water. This recognition is weighed against existing caste prescriptions of impurity and pollution and norms of maintaining distance from people

considered impure because of their lower caste status. The tensions between these two logics underpins the modern problem of coexistence and copresence of hierarchized groups that come into contact in public settings. These hierarchically segmented forms of civility draw on and are reflective of the cultural forces behind the frames that strangers use to recognize each other. These cultural forces underpin stranger sociability at the filtration plant, which is described and, at the surface, seen as a public space. Yet the idea of public space that offers equal access to an imagined public is not only a recent liberal phenomenon but furthermore, is an unevenly distributed space (Thiranagama, 2018; Waghmore, 2013). In his exploration of Dalit politics and modes of caste civility in Western India, Suryakant Waghmore observes that in villages, spaces considered to be public are effectively rendered private through ideas of ritual and political superiority that dominant castes enjoy.

In the case of Kot Asadullah and Kalalanwala, the contamination of the water aquifer had produced social groups categorized around disease and deformity. These new categories overlapped with pre-contamination social categories to produce differentiated experiences of death and deformity in an uneven social space. Set in a deeply hierarchized society shaped around caste, religion, and class differences, this case study draws our attention toward polluted landscapes that shape the modalities of coming together of strangers and the new modes of distinction that are produced along the way. These modalities are undergirded by a sense of urgency driven not only by the limited hours in which thousands of households in the two villages must collect their water but

also a recognition of increasing levels of toxicity in the water pumped by the filtration plant.

The degree of separation maintained and negotiated at the site of the filtration plant is reflected in the spatial organization of the villages that are organized around caste lines. The categories of insider and outsider, the stranger and familiar reproduced at the filtration plant are mapped onto the neighborhoods, water infrastructures and broader social life of the villages. As toxicants continue to extend their presence through the bodies of children being born with bone deformities in Kot Asadullah and Kalalanwala, they render the stranger familiar, and oneself strange.

An uneven space

I met Shahzad Ashraf through an official of the Water and Sanitation Authority in Kasur district. As the nephew of the minorities' representative in the union council, Shahzad was considered well-connected and well-placed to accompany me on my trips to the water tubewells and abandoned water collection stations in the village. His job was to run the government water supply tubewell thrice a day for three hours each and collect money to pay for its electricity and maintenance from every household in the two villages.

On my first visit to his house in Kot Asadullah, he urged me to accompany him to the Christian basti, where I would get to "witness the extent of the water crisis". The residents of Christian basti, he claimed, had experienced several deaths due to water-borne diseases. Yet no one talked about that, he added. The issue of bone deformities had eclipsed the horror of death in media discussions of the problem of water contamination. Secondly, the expansion of the basti into an informal settlement in the 1980s, had meant that water and sanitation facilities in the basti were constructed differently from the rest of the village. As a resident of Kot Asadullah, Shahzad was aware that he enjoyed privileges withheld from residents of the basti who were widely considered and talked about as being lower caste and impure.

We walked through the Christian basti which was two streets away from his house. It is hard to tell where the village ends and where the basti begins. A dirt track runs all the way through the neighborhood and connects to a street in Kot Asadullah. A similar street also runs through Kalalanwala, connecting it to Kot Asadullah.

Kot Asadullah and Kalalanwala are neighboring villages. Their streets crisscross into each other and they share the same mosque, primary school, public hospital, water tube-wells and the filtration plant. However, they lie in two separate districts, and this demarcation has had important impacts on coordinating planning and development projects, cases filed with environment tribunals and labor courts, the police system and access to development funds. Kot Asadullah lies in Lahore district, the capital of Punjab province, and Kalalanwala in Kasur district. In terms of obtaining access to safe drinking water, this administrative partitioning has led to an unevenness in allocation of development projects, distributing development funds, political canvassing (they lie in separate electoral constituencies) and possibilities for access to drinking water. The Christian basti is situated on the peripheries of Kot Asadullah, near Multan Road. Though considered a part of Kot Asadullah in administrative documents, the residents of Kalalanwala and Kot Asadullah refer to the Christian basti as separate and outside of their villages. This is reciprocated by residents of the basti who speak of Kot Asadullah as being separate from their area.

Shahzad knocked on the door of a large house with a yellow gate and an elderly lady with a walker answered it. We entered a large cemented courtyard surrounded by yellow painted walls and a covered veranda where we sat on two charpoys. The woman had moved to the basti in the 1980s after her marriage into a family that had lived there since the 1960s. The family had been indebted to a crop tenant in Kalalanwala and worked on their fields as indentured labor. However, her husband had insisted on educating their child. They sent him to a school set up in the compound of the Roman Catholic Church in the basti. I asked her why they didn't send him to the Kalalanwala Primary School, which had been the center of attention since the first cases of bone deformities had emerged among students of that school. Shahzad and the woman appeared surprised at the question. The separation between Christian and Muslim children begins at school where discrimination is *taught* in the form of maintaining separate utensils. Moreover, certain teachers in the village had refused to teach Christian students in the past, they said, discussing the names of teachers they knew who had turned away students after learning that they were from the Christian basti. When her son turned 15, he developed limb leg discrepancy but did not discontinue his education like many other children who were affected.

"You have no idea how refreshing it is to see an educated Christian. My son is also educated. He is in a Catholic seminary in Lahore and once it is complete, he can bring me to Lahore," she said. The reference to education marks one of the ways in which residents of this basti have managed to escape caste prescriptions and achieved social

upward mobility with a change in class status. This change allows them to compete on a somewhat equal ground with other groups around them and 'escape' caste. The explanation of how her son's ability to leave behind caste stigma could allow her a means of leaving the basti is telling of the aspirations and life projects shaped by the contamination of water and recognition of living in a socially stratified place.

Because Christians and Muslims have always been separated, she went on, this water problem made things worse, she said. "In the old days, people did not let (lower caste) Christians drink from the village well, for all the development in the world, now we are back at the village well, only we call it a filtration plant." We all laughed at the irony of the situation at the time, but on reflection, this is a powerful statement. It is reminiscent of the violence described in Section 3 of the Prevention of Atrocities Act 1989, which ascribes punishment under the Indian Penal Code for anyone who:

(x) corrupts or fouls the water of any spring, reservoir or any other source ordinarily used by members of the Scheduled Castes or the Scheduled Tribes so as to render it less fit for the purpose for which it is ordinarily used.

The references to intra caste violence in regular statements like this woman's, invokes the ways in which lower castes have experienced hindrances in accessing critical resources within the same village space.

Producing contamination

It would be incorrect to believe that the contamination of the aquifer in Kot Asadullah and Kalalanwala was a singular event or occurrence. As William Cronon explains in his foreword to Toxic Archipelago, the second half of the twenty first century was marked by an awareness of a "proliferating presence of toxic compounds in webs of ecological relationships" (Cronon, 2010). The aftermath of the development era in the 1960s had made it clear that whereas science and technology were once looked to for solutions to environmental problems, as agents of development, they were often found to be responsible for those problems. This new sense of awareness of toxicity is embedded in a wider social and cultural context (Arnold, 2016).

Toxicity has, in recent years, come to encompass a broader conceptualization of poisoning of people and the environment, as a result of modern industry and urban living (Arnold, 2016). In his detailed history of poison as a culturally embedded practice and mode of governance in pre-colonial and colonial India, Arnold lays out a history of the ways in which poison entered the realm of colonial governance through a need to regulate and manage toxicity, observe its presence and bring it under scientific control in the pursuit of public health. He argues that the discourse of toxicity in India was complicated by the cultural and ritual meaning assigned to the term 'pollution'. Tracing mentions of pollution in sanitation and public health documents, Arnold demonstrates how the

scientific and secular meanings of pollution existed alongside the concept of pollution in ritual and social practice.

In an 1853 report on the water supply system in Calcutta, the engineer F.W. Simms claimed that the city's water supply system was being opposed by the upper-caste Hindus who believed that water passing through iron pipes would become ritually impure. They preferred to draw water from the Hooghly distributary of the sacred Ganges River instead, the report added. Furthermore, the upper-caste Hindus objected that the engine that pumped water from the Hooghly was greased with animal tallow that was also ritually polluting. The government attempted to convince them that using the water supply provided safer drinking water, but actually managed to gain acceptance after a Brahmin was put in charge of the pumping works. This compromise had allowed the upper-caste Hindus to escape ritual impurity as well as environmental pollution (Arnold, 2016).

Arnold's argument that India's toxic past maps onto its toxic present is reflected in the coexistence of secular and ritual notions of pollution, and their recognition by the state, which continued after the partition of India and Pakistan in 1947.

Pakistan's policy framework for industrial growth in the 1990s involved the suspension of Environment Protection Councils that were tasked with conducting environmental impact assessments (EIA) of all development projects. This suspension

was followed by a mushrooming of manufacturing and assembly factories along Multan Road where Kot Asadullah and Kalalanwala are located (Aftab & Ali, 2000). There was a subsequent explosion in the number of tanneries and brick kilns that were dumping effluents into Rivers Sutlej and Ravi with impunity (Farooqi et al., 2007).

Residents of the villages place the emergence of factories in their area between 1994 and 1996. The Wires Manufacturing Industry Ltd built a factory across the road from the villages, while Honda Atlas Cars Pakistan Ltd and TU Plastic Industry, among others, opened up at around the same time in the vicinity. The emergence of the factories coincided with a sharp decline in agricultural production in the villages of Kot Asadullah and Kalalanwala.

"At first, we noticed our cattle falling sick and many of them died. Then crops stopped growing… now even cattle fodder doesn't grow in our area, that's how polluted the soil is," a shopkeeper from Kalalanwala told me. While the inability to produce anything from the land that had once been fertile drew the residents' attention to an increasingly polluted environment, their bodies came to bear the proof. Residents recounted to me during various occasions the ways in which they realized they were falling ill.

Around 1998, the first cases of bone deformity among children were reported from these villages.

Basharat Ali was 15 years old when he realized he was falling sick. “I noticed that my legs would hurt, and I was laying down a lot. I initially thought it was nothing, but eventually I was holding onto walls in order to walk.”

I met Basharat on my first visit to Kalalanwala in 2016. I was a journalist at the time and was assigned a follow up story on the contamination of the water aquifer. I was standing in the middle of a street interviewing a woman on her way home from visiting a hospital, when Basharat walked up to me and introduced himself as the poster child of the contamination crisis. I went to his house where his mother and sisters had collected newspaper cuttings and clips of Basharat’s interviews with the media after the government announced free surgery for him. Going through old pictures of Basharat shaking hands with the then governor of Punjab, being wheeled into surgery and talking to reporters, tears streamed down his mother’s face. She pulled out a disability certificate and waved it in the air.

“He can’t get a job because of his legs. The governor promised that all affected children from Kot Asadullah and Kalalanwala will get government jobs under the disability quota. We educated him so he could do a desk job but when it came to it, he was told that the government isn’t giving anyone jobs anymore,” she said.

A few days before this visit, there had been a huge protest by an association of visibility impaired individuals in Lahore that had been baton charged by the police. They, too, had been demanding jobs under the 2% job quota for disabled persons. It came as no surprise that the promises of employment for affected residents of these villages did not materialize. There were just too many cases of disability as every household I visited had at least one person with a disability certificate.

"Children on their way to school were falling in the streets, and we couldn't understand why," another mother shared with me.

Almost half of the cases in the village were among children under 12 years of age. But adults and teenagers were experiencing the problem too.

The toxicity of the agricultural fields had further transformed labor relations upon which the villages were previously organized. What turned out to be barren wastelands subsequently resulted in the creation of surplus labor which became absorbed in the emerging factories. The farmland was sold off and incorporated into the landholdings of factories and a large water and golf resort. This also meant that those residents of the Christian basti, who worked as seasonal labor on farms, were no longer servitors for the landowners of Kot Asadullah and Kalalanwala. Instead, all residents had to look to the factories for jobs.

“It took us several years to make the connection between the factories’ dumping their toxic waste and our drinking water, and the government wasn’t even concerned,” a resident of Kalalanwala told me.

Not only were the factories fast depleting the water table but were dumping toxicants in it. It was factory workers from these villages who blew the whistle on two factories adjacent to the villages, Wires Manufacturing Factory and Honda Atlas, that were dumping their effluents into 100ft deep wells, directly into the water aquifer. The government tubewell that Shahzad operated was located within 100 meters of another factory that also disposed of its effluents in the water table.

The politically connected and influential elders in the villages gave a call for residents to gather in the village mosque to figure out a solution to the water crisis. A solution seemed impossible for it suggested that the village residents were experiencing toxicity in similar ways. I later learned from speaking to Christian residents in the basti that between 1998 and 2000, several families there had lost their children to water-borne illnesses, while almost every resident carried the marks of contamination in the form of rotted teeth, limb-leg discrepancy and bowed legs. At the meetings called to discuss the water problem, residents of the Christian basti raised the problem of increased deaths in their families and connected that to the water contamination.

The residents attributed this discrepancy in experience to the fact that the basti borders Multan Road and is closer to the most polluting factories. However, further inquiry into the informal construction of the basti revealed an absence of water and sanitation facilities. Most households in the Christian basti used handpumps dug at 100ft for water use, thus the contamination of the shallow aquifer hit hardest where hand pumps were the main source of water supply. The villagers decided they would have to take immediate action and make a case for water and sanitation facilities in both villages.

After appeals to local representatives and the Health Department in Lahore fell on deaf ears, the villagers contacted journalists of a prominent newspaper who broke the news. The reporters reached out to then Punjab Governor Muhammad Safdar for a response to the crisis and he announced that he would visit the two villages and see for himself.

Many residents described to me the way in which children's bodies were used in an exposé for the governor's visit. Bau Ameen, a central figure in the water contamination episode and the focal person who connects NGO networks with residents, carefully selected the children and young adults with visible bone deformities and stood them in line to shake hands with the governor. Basharat Ali was one of the children in the line. He recalled to me that the governor had promised several amenities for the villages including free surgeries for the children and employment opportunities for affected residents under the disability quota in public service employment.

The governor announced that Kot Asadullah would become a model village, a category under the UN Millennium Development Goals which imagines disaster-resilient communities through development interventions in the form of provision of basic amenities such as clean drinking water, hospitals, and access to administrative services. The change in village status acknowledged the disaster that had hit the two villages and the idea was that development in Kot Asadullah would uplift the status of neighboring Kalalanwala. Residents of the Christian basti had equal access to the new public infrastructures aimed at simultaneously creating the myth of disaster-resilient communities and solving the problem of water toxicity.

However, the imagined separation of the Christian basti from Kot Asadullah created a fractured relationship with the new developments taking place. The Christian basti in this vision is composed of unmarked bodies and reveals a conception of the liberal subject. However, the everyday rough-and-tumble to access water and make claims on public amenities paints a different picture. The Christian basti residents have to negotiate their share of water and the possibilities to even share the space where water is collected with other status residents. The filtration plant was made into a segregated space, where the presence of the Christian basti residents was made possible through maintaining distance and separation.

"The government promised us a lot of things including surgeries of the 150 people who had been affected but in reality, only two children were operated on and the doctors only operated on one of their legs," Basharat, who was one of the two children, had told me.

The government installed a tube-well bored at 700ft in 2000 to provide safe drinking water to the residents and transferred its ownership to a politically connected resident of Kot Asadullah. A large water tank was constructed to store the water.

But the residents had wanted the factories to stop polluting the water. "We all participated in massive protests on Multan Road and were contacted by a lot of NGOs and civil society people who wanted to help us," a resident of the Christian basti told me.

On orders of the governor, Wires Manufacturing Factory was sealed for six months in 2000. Between 2000 and 2005, the residents mobilized and registered 48 cases with the Environment Tribunals against various tanneries, brick kilns, poultry feed factories and the factories surrounding the villages, a majority of which were decided in their favor. However, the tribunals only issued fines to the factories, the heaviest of which amounted to Rs10,000. "This isn't even enough to cover the medical cost of one person," he said.

These problems do not fully encapsulate the reasons why prosecution in such cases are only rarely pursued in Pakistan. Factory owners wield disproportionate power and influence with the state machinery. However, these incidents proved disciplining for the villagers. The factories closest to the villages fired the villagers, while the factories in the neighboring towns of Bhai Pheru, Patoki and Manga Mandi warned that they would only get jobs if they did not create problems for them. Even two decades after the contamination, none of the residents of the villages work in the factories nearest to them. The disenchantment with state-led initiatives for humanitarian assistance and environmental justice in Kot Asadullah and Kalalanwala was further deepened after the water dispensed from the tubewell became foul and brackish within a few years of installation.

Living with toxicity

Between struggling for access to clean water and against factories dumping their waste in canals and groundwater, the residents of Kalalwanala and Kot Asadullah have become attuned to the variations in levels of toxicity in the water available to them. It allows them to discern the condition of industrial growth in their immediate surroundings as well as decide when a filtration plant needs to be replaced. Their bodies carry the marks of the toxic effects of industrial pollution in the form of fluorosis, neuropathy, and a host of liver-related diseases.

In December 2017, Herald Magazine published a cover story titled Muddy Waters, which contextualizes the continuing process of government assurances and promises to provide safe drinking water through a chilling description of the residents of Kot Asadullah and Kalalanwala:

"Weak, hobbling figures emerge from a thick blanket of smog – a toxic mixture of early winter fog, industrial and agricultural smoke, and general environmental pollution – in Kulalanwala. They limp to their destinations on a recent November morning. Most of them work in nearby factories. Others have office jobs or small shops and businesses to run. Agriculture has all but died in and around the village. Some local residents have sold their farms to the water and golf resort, others have given it to

factories in exchange for money even when they blame industrialization for poisoning their water and environment." (Khan, 2017)

Similar depictions and representations of residents of Kalalanwala and Kot Asadullah appear in multiple news reports ending with a government official expressing incredulity, or resolve to do something about the matter (Contaminated Water Is Poisoning Two Villages in Kasur | Samaa, 2018; Toxic Water in Punjab's Kot Asadullah Village Infamous for Causing Deformities, 2018; Villagers Fall Gravely Ill Due to Contaminated Water in Punjab, 2018). The dramatic image of "weak, hobbling figures" emerging from a blanket of smog could be a scene out of a post-apocalyptic zombie movie. Yet here, it means to evoke a moral and affective response in driving home the distinct ways in which residents of these villages appear different from people living elsewhere. The paranoid style of depiction mirrors an urgency one feels in the face of slow, yet vivid violence that marks a community. The AFP story (2018) quotes a shopkeeper in the village: "People from other villages can recognize us and say, 'You are from Kalalanwala'."

These bodily inscriptions convey meaning, memory, and life possibilities for a population residing in a toxic space. For Sheeza, a young mother from Kalalanwala, who has been noticing the declining quality of drinking water from the filtration plant, the fear of contamination is connected to fears for her daughter's future.

Cradling her month-and-a-half old daughter in her lap, she pulled up her daughter's pajamas to reveal her bowed legs. Her elder daughter, now two years old, also had bowed legs and suffered from severe mineral deficiencies.

"Girls are not a burden, they are a blessing, but with a father who won't be able to work in a few years, it would have been nice to have a boy who could take his place as the bread earner," Sheeza's mother-in-law said, pausing and adding, "My husband still works but we will soon depart from this world, how will they survive without us?"

Sheeza had moved to Kalalanwala after her marriage and learned about the water crisis. Having had two daughters, she had been under pressure to produce a boy, but with both her children affected by bone deformity, she wasn't sure it was wise to have more children. "Just look at how beautiful and tiny she is," she said, smiling down at her infant daughter. "But who would marry her?"

Such concerns for the future are repeated in every household that has members affected by the polluted water. Parents line up their children, perhaps because the straight lines highlight the unevenness of their legs – a performance perfected over years of attempting to explain verbally the severity of the water crisis in the area.

Basharat Ali's father, who had also lost the use of his legs, told us that they had trouble finding a suitable match for their son because of his leg deformities.

During my visits to the hospitals in neighboring Bhai Pheru and Manga Mandi, where residents of Kot Asadullah and Kalalanwala go for treatment, I learned about several stereotypes attached with the place. The doctors talked about how a general lack of hygiene and sanitation had worsened the water problem for the residents. “They don’t even know how to take care of themselves.” From speaking to other attendants, I learned that the villages were infamous for practicing black magic, which is why the residents and their children were being punished by God. The overall reputation of villages were generally seen from this discriminatory lens but also reflect the complexity of how ‘pollution behavior’ functions on a social level.

In Mary Douglas’s structuralist work on pollution, dirt is defined as “matter out of place” (1966). She understands ‘dirtiness’ as a social construction embedded within cultural systems of classification and ordering insofar as it rejects ‘inappropriate elements.’ This approach to dirt provides a link towards understanding the ambiguous idea of dirt or the ‘rejected elements of the ordered systems.’ Douglas explains that our ‘pollution behavior’ is rooted in an in-built tendency which “condemns any object or idea likely to confuse or contradict cherished classifications”. The role of these cherished classifications is multi-fold but ultimately breeds an ordered and stable world through which those objects or ideas that are seen as ambiguous or as decentering the existing order of classifications are either made part of the system of assumptions or they are rejected.

Culture in this context provides a standard for values that describe the environment or community but helps mediate experiences of individuals in the community. The porosity of the body, and for Douglas, the social body, signals a vulnerability to dirt, highlighting the need for maintaining appropriate distance and separation from ritually polluting persons, as well as residents of the villages who have come to embody toxicity. This is played out within the village at the site of the filtration plant as the tension between demarcations and maintaining a distance become a point of conflict.

Toxic development

From framing the contamination as a crisis of ecological devastation that had resulted in loss of agricultural land and livelihood, and created bodily markers of pollution in their children, both the Christian and Muslim residents diverted their energies towards finding alternative sources of water from neighboring towns.

The contamination in Kalalanwala has been written into several development projects to provide access to safe drinking water. The federal government under the dictatorship of General Musharraf had launched the Clean Drinking Water initiative under the National Environment Action Plan in 2004 to meet the UN millennium development goals. The project was funded by international donors and received $8 million to construct filtration plants across the most affected parts of the country. Marred by delays and controversies, the project was seen as a massive failure of the state in overseeing its own projects. In 2013, the Punjab government under Shahbaz Sharif announced the Saaf Paani Project (Clean Water Project) and made Kalalanwala and Kot Asadullah the pilot place for that project, but it also met a similar end to Musharraf's attempts at constructing filtration plants across the country. Sharif is currently facing corruption charges worth billions of rupees for this project. The consistent failure of these projects in meeting linear deadlines and managing corruption scandals only strengthened the World Bank's assertions that market-based solutions were the only way out of the water crisis.

This new sense of precarity and tone-deaf responses from state officials and elected representatives was leading to the realization that dispossessed of their land and use of water resources the residents of Kot Asadullah and Kalalanwala were very much on their own. The media outreach had, however, created enough publicity for these villages to become a hotspot for an array of NGOs that were emerging as key players in the development sector in the late 1990s and early 2000s.

I had earlier mentioned Bau Ameen as a focal person in the NGO circuit that has installed two filtration plants in the villages since 2013. He was present at the panchayat called to mediate tensions between Christians and Muslims last year even though he hadn't lived in the village since 2013. I went to his house in a gated community in Manga Mandi, a half-an-hour drive away from Kot Asadullah.

Now in his 60s, Bau Ameen was a retired low-ranking officer of the Punjab Health Department and he ran the Kasur chapter of Human Necessity Foundation, an NGO started by the late singer-turned-cleric Junaid Jamshed and was funded by expatriate donors in Saudi Arabia and the US. He was sitting underneath a Neem tree outside his house surrounded by a group of men who were there to ask him to build a water filtration plant in another part of Manga Mandi where the government-installed filter plant had not been maintained for several years. After a round of introductions, we

all walked to a newly constructed filtration plant that his NGO had set up on the corner from his house for a walk through of how a filtration plant works.

Reverse osmosis plants are considered the most effective way to remove Arsenic and Fluoride from groundwater, he explained. However, they do not filter out biological contaminants or many soluble metals. The high prevalence of Arsenic and Fluoride in the groundwater is tied to anthropogenic activity such as digging for wells and canals that leaches naturally occurring arsenic in rocks and soil into the water table.

"Most filter plants don't dispense pure water because it takes an hour for the level of toxicity to stabilize in water, and because of hourly power outages most filter plants are nearly always in that first phase of trying to stabilize the level of toxic materials," he added.

Of the water pumped up from the groundwater, 70% is returned in the form of concentrated toxic materials called brine. Ideally, the brine should be disposed of in the sewage system that would be treated and neutralized before adding it to the water system. However, the sewage network is notoriously leaky and outdoor open drains form a major part of the sewage system. Since there is no waste treatment center, the brine is dumped through pipes in the nearest canal, or back into the ground, from where it seeps back to the soil and water table. Groundwater pollution is often permanent, and researchers say it may take hundreds or even thousands of years for pollutants such as toxic metals from tanneries to be flushed out of a contaminated aquifer (Farooqi, 2015; Aftab, et al., 2000).

The process of extracting polluted water and dumping the concentrated toxic brine back in the soil only to pull it up again and filter it, is metaphoric of the cyclical rut the residents of both villages find themselves in – their attempts to obtain safe drinking water have only accompanied a new set of problems they find themselves increasingly unable to handle. The disciplining experience of protesting against factories, relying on the state for environmental justice, the continuing and constant flow of toxicants in the water and an increasing awareness of toxicity shrouds and fetishizes technological fixes like filtration plants in polluted spaces like Kot Asadullah and Kalalanwala.

A ubiquitous presence in Punjab's urban neighborhoods, the reverse osmosis water filtration plant has become a site to struggle for and obtain access to safe drinking water for communities. As such, it has come to be considered essential infrastructure that mediates the circulation of groundwater and expressions of toxicity among working-class communities.

While much of the work on essential infrastructures attends to the social processes that accrete on and through infrastructure, its visibility and breakdown, and the ways in which it enables or disrupts capitalism, it is important to center the material conditions that create the necessity for such infrastructure. How do filtration plants become the most viable form of solving the problem of water scarcity? Scholarly work on the relationships between water, infrastructure and polluted landscapes have engaged technologies of remediation as sites through which people evaluate the legitimacy of the state and where citizenship is negotiated and imagined (Anand, 2017). They can be seen as systems

which create the grounds on which other objects operate (Larkin, 2013), through which communities enter pacts and promises with each other (Ballestero, 2019).

Using technopolitical forms and registers to understand expressions of discontent in post-apartheid South Africa, Antina von Schnitzler (2018) draws attention to how political claims making converges on apolitical functions of the state such as service delivery. This is a function the state appears increasingly unable to perform. Similar to the prepaid meter in Von Schnitzler's construction of the technopolitical device, a central feature of democracy's infrastructure, the deployment of the filtration plant is deeply political. Packaged as a humanitarian object, the filtration plant develops a mystical quality, bound up in processes of concealment, transformation and mystification (Scott-Smith, 2013). The question of environmental justice becomes tied to and imagined through devices that expand space for development and growth and the reproduction of life possibilities.

The promise of such devices lies in their ability to bring closer an imagined future where toxins do not inhabit water or bodies, and water saves rather than kills. It is the perceived ability of the device to defer the harmful consequences of toxins and place distance and uncertainty between toxic materials and the people they affect (Murphy, 2006). As the filtration plant becomes embedded in public imaginations and spaces it works to (re)produce social relations

1. That draw on tensions between hierarchical and egalitarian logics based on notions of caste impurity and desire for equitable access of clean drinking water

2. That are produced in uneven social spaces where the effects of toxicity are magnified in vivid and differentiated ways

3. That are forged around access to neoliberal development agencies

These infrastructures conceal sites of toxic dumping by centering attention on issues of managing water. They further conceal the role of global financial institutions that have instituted multiple regimes of development and financialization through the enforcement of austerity measures and state rollback from welfare services. They have helped transform the notion of environmental justice and how we understand 'relief' and 'resilience' to environmental disasters and ecological collapse. Like commodities, such infrastructures become a “self-enclosed entity, dominant over its creators, autonomous, and alive with its own power” (Taussig, 2010).

As I was writing this paper, I was contacted by an NGO in Lahore that recently obtained a project from the UK-based Department for International Development (DFID). They had received funds to install reverse osmosis filtration plants in spaces where tensions between Muslims and Christians had previously erupted into spectacular violence. According to the research they had conducted for this, the main source of existing tensions between the residents of Joseph Colony, a Christian neighborhood in

Lahore that was burned down in 2015, and Sheikhabad (a neighboring Muslim locality whose residents had torched the houses in Joseph Colony) was the problem of sharing water from the same filtration plant. The idea of separation of filtration plants for various communities that view each other through the lens of purity and impurity has provided new modes of intervention for development agencies. This is occurring in the backdrop of increasing pollution and depletion of ground water sources that are fast making Pakistan one of the most water scarce countries in the world.

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